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Effect of Different Potting Media in Different Potted Croton (*Codieum variegatum*) Varieties under Shade Net Condition in Allahabad, India

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A B S T R A C T

The research study was carried out to investigate "The effects of different potting media in different croton (*Codieum variegatum*) varieties under shade net conditions in Allahabad" at the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom Institute of Agriculture, Technology and Sciences using Factorial complete randomized design of experiment. Four varieties were evaluated with four different growing media in shade net condition. Coco peat (CP), vermicompost (VC) and farmyard manure (FYM) in different proportions were used as growing media. Maximum number of leaves (8.1) and plant height was recorded in Rustifolia with the media containing coco peat + vermicompost + farmyard manure in 1:2:1, (v/v) combination and maximum leaf area (85.93cm^2) in Petra and root length (21.1cm) in Petra were recorded with the media containing coco peat + vermicompost + farmyard manure in 1:1:2, (v/v) combination.

Introduction

Croton (*Codieum variegatum*) belongs to the family *Euphorbiaceae*, also called as Garden Croton or Variegated Croton. It is very popular indoor plant due to its colorful ornamental foliage with thick, leathery, glabrous and waxy texture in various shapes and commonly used as hedges, potted patio specimen or in shrubberies. Foliage plants are often used as indoor plants because of their attractive foliage and their ability to survive and grow under limited indoor light (Chen and Henny, 2008).Indoor plants also fulfill psychological needs of people by providing green color and comfort and enhance the indoor environment to make it more aesthetically pleasing (Bringslimark *et al.*, 2007). Shape of leaves vary from ovate to linear, entire or lobed, flat or twisted and variegated with green, white, purple, orange, yellow, red or pink. Variegation is the occurrence of pattern, results of differences in the amount or composition of chlorophyll although other pigments *i.e.* anthocyanin and carotenoids and the variegation appearance can be altered by environmental factors, particularly light intensity (Tilney-Bassett, 1988).House plants provide people with aesthetic appreciation and other beneficial effects. Plants can effectively improve the indoor air quality by reducing volatile organic compounds, such as formaldehyde, benzene, toluene, ethylene, and xylene (Thomsen *et al.*,

2011; Wolverton, 1988), thus reducing the risk of sick building syndrome (Kim *et al.*, 2011).In order to reduce costs and adopt more environmentally-friendly practices, research on alternative substrates is of great interest, and several alternatives have been proposed (Lazcano *et al.,* 2009). The parallel increasing concern in waste recycling has led to the proposal of some organic materials such compost-like substrates (Ostos *et al.,* 2008) In potted plants nowadays soilless media are used as growing media because of its tremendous benefits *i.e.*, good water holding capacity, porosity, aeration and free from water logging conditions and less chances of weed growth, pest and disease infestation. In present study, coco peat, vermicompost and farmyard manure were used in different proportions. Coco peat, which improves porosity, wettability, water holding capacity, cation exchange capacity and buffers pH well, in a very acceptable range for plant growth, where on the other hand; vermicompost, rich in humus and contains valuable vitamins, enzymes and hormones like Auxins, Gibbrellins, etc. for better growth and development (Pathma and Sakthivel, 2012). Farmyard manure is also a promisable growing media which avails all essential nutrients to the plant easily. The choice of urban landscaping is very popular among people by decorating houses with potted indoor plants for which ideal growing media is also required. So, the present study aims to provide this data for exploring the growth of best variety of croton using different growing media under shade net conditions for better quality production of ornamental foliage.

Materials and Methods

The research study was conducted in the 50% Shade net at Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh during the period of November, 2016 to March, 2017. Rooted cuttings of croton plants of four different varieties *i.e.*, Petra (V1), Golden Petra (V2), Rustifolia (V3) and Duckfoot (V4) were obtained from Ashalata Nursery, Sewli Telinipara District, West Bengal.

Pots of 12" were thoroughly filled with media according to treatments combination *i.e.*, M1 [CP+VC+FYM@1:1:2 (v/v)], M2 [CP+VC+ FYM@1:2:1(v/v)], M3[CP+VC+FYM@2:1:1 (v/v)] with M0 [garden soil] and rooted cuttings were transplanted.

The experiment was carried out in Factorial Complete randomized design at 5% of significance and each of the treatment consisting of five plants was replicated thrice.

The different treatment combinations are as follows; T1 (V1M0), T2 (V1M1), T3 (V1M2), T4 (V1M3), T5 (V2M0), T6 (V2M1), T7 (V2M2), T8 (V2M3), T9 (V3M0), T10 (V3M1), T11 (V3M2), T12 (V3M3), T13 (V4M0), T14 (V4M1), T15 (V4M2) and T16 (V4M3). The growth parameters including number of leaves, plant height (cm), leaf area(cm^2) and root length (cm)were recorded at 30, 60 and 90 days after planting.

Results and Discussion

Number of leaves was found to be significant among all treatments. Maximum was in T12 (8.1) in Rustifolia with M2 (1:2:1) followed by T16 (7.9) in Duckfoot with M3 (2:1:1) and least in T1 (3.6) in Petra variety in control. Maximum number of leaves might be due to vermicompost, which is rich in humus and contains valuable vitamins, enzymes and hormones like Auxins, Gibbrellins, etc. for better growth and development (Shadanpour *et al.*, 2011).

Table.1 Effects of different growing media on different potted Croton varieties

Varieties(A)	**Number of leaves**				**Plant height**			
	Media(B)				**Media(B)**			
	V1	**V2**	**V3**	**V4**	**V1**	**V2**	**V3**	**V4**
M0	5.133	6.367	7.267	8.200	10.667	11.600	13.167	16.433
M1	4.533	6.633	6.467	7.100	10.567	11.933	12.867	14.267
M2	6.700	7.433	7.367	8.200	11.633	15.033	18.500	18.233
M3	6.967	7.433	7.833	8.333	12.300	14.800	14.733	13.400
Comparison		**F-test**	**S.Ed(±)**	**C.D.at 5%**		**F-test**	**S.Ed(±)**	**C.D.at 5%**
Due to varieties(A)		S	0.140	0.286		S	0.256	0.523
Due to media(B)		S	0.140	0.286		S	0.256	0.523
		S	0.279	0.571		S	0.511	1.046
Varieties(A)	**Leaf area**				**Root length**			
	Media(B)				**Media(B)**			
	V1	**V2**	**V3**	**V4**	**V1**	**V2**	**V3**	**V4**
M0	24.790	85.930	83.953	43.953	10.600	21.100	16.367	13.667
M1	58.357	64.493	67.460	57.453	15.667	16.667	16.500	19.733
M2	29.110	64.790	79.813	66.043	10.767	14.900	13.400	14.400
M3	44.600	74.550	67.243	63.463	11.300	14.400	17.167	15.767
Comparison		**F-test**	**S.Ed(±)**	**C.D.at 5%**		**F-test**	**S.Ed(±)**	**C.D.at 5%**
Due to varieties(A)		**S**	0.569	1.163		**S**	0.332	0.679
Due to media(B)		**S**	0.569	1.163		**S**	0.332	0.679
		S	1.137	2.327		**S**	0.664	1.358

Maximum plant height recorded in in T12 (20.13cm) in Rustifolia variety with potting media composition coco peat, vermicompost and farmyard manure (2:1:1) followed by T10 (19.56cm) in Rustifolia variety with media composition coco peat, vermicompost and farmyard manure (1:1:2) and least in T1 (10.1cm) in Petra with control. Plant height differed significantly among all the treatments might be due to the rich source of nutrients present in vermicompost (Ikram *et al.*, 2012) and varied growth behavior in different varieties and further modified by environmental conditions prevailing during the time of crop growth. Maximum leaf area (cm^2) recorded in T2 (85.93) in Petra with M1 (1:1:2) followed by T3 (83.95) in Petra with M2 (1:2:1) and least in T1 (24.79) in Petra with control. FYM slowly provides all the essential nutrients throughout the growth period for better growth (Akparobi, 2009) Great variation in the leaf area is also one of the main characteristics of Croton as concluded in Mollick *et al.*, (2011). Maximum root length was observed in T2 (21.1 cm) having media composition coco peat, vermicompost and farmyard manure (1:1:2) in Petra followed by T8 (19.7cm) in Golden Petra having media composition coco peat, vermicompost and farmyard manure (2:1:1) and least in T1 in Petra with control. More root length will lead to a floriferous vegetative growth by absorbing high amount of nutrients from media. High amount of FYM ultimately resulted in enhanced growth of plant, as reported by Akparobi (2009) in amaranthus.

On the basis of research study, it is concluded that number of leaves and plant height observed maximum in T12; Rustifolia in media combination coco peat, vermicompost and farmyard manure (1:2:1) and maximum leaf area and root length in T2; Petra in media combination coco peat, vermicompost and farmyard manure (1:1:2).

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